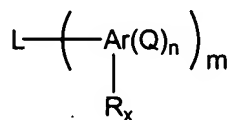


## WHAT IS CLAIMED IS:

1. An adhesive composition comprising a benzoxazine compound and a curing catalyst, wherein said benzoxazine compound has the structure:

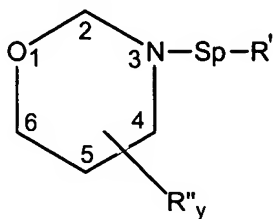


wherein:

L is an optional alkylene or siloxane linking moiety,

Ar is optionally substituted arylene,

Q is an oxazine ring or amine salt thereof having the structure:



and is bonded to Ar in a fused manner at positions 5 and 6 of the oxazine ring,

wherein:

Sp is optional, and if present, is a C<sub>1</sub> to C<sub>6</sub> alkylene, oxyalkylene, thioalkylene, carboxyalkylene, amidoalkylene, or sulfonatoalkylene spacer,

n is 1 or 2,

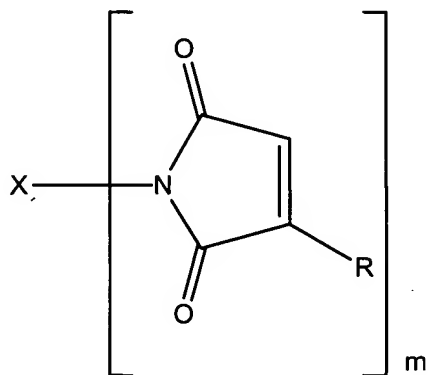
m is 1 or 2,

x and y are each independently 0 to 4, and

wherein at least one of R, R', or R'' is a polymerizable moiety.

2. An adhesive composition according to claim 1, wherein said polymerizable moiety is optionally substituted alkenyl, oxyalkenyl, alkynyl, cycloalkenyl, bicycloalkenyl, styryl, (meth)acrylate, itaconate, maleimide, vinyl ester, epoxy, cyanate ester, nitrile, diallyl amide, benzocyclobutene, aromatic propargyl ether, aromatic acetylene, or oxazoline.

3. An adhesive composition according to claim 1, wherein said polymerizable moiety is participates in a condensation polymerization.
4. An adhesive composition according to claim 1, wherein said polymerizable moiety is a siloxane.
5. An adhesive composition according to claim 1, further comprising one or more co-reactants.
6. An adhesive composition according to claim 5, wherein said co-reactants are maleimide, epoxy, urethane, or cyanate ester.
7. An adhesive composition according to claim 6, wherein said maleimide is a liquid maleimide.
8. An adhesive composition according to claim 7, wherein said liquid maleimide has the structure:



wherein:

$m$  is 1-3,

each  $R$  is independently hydrogen or lower alkyl, and

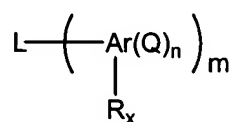
$X$  is a saturated straight chain alkyl, alkylene, or alkylene oxide, or branched chain alkyl, alkylene or alkylene oxide, optionally containing saturated cyclic moieties as substituents on said alkyl, alkylene or

alkylene oxide chain or as part of the backbone of the alkyl, alkylene or alkylene oxide chain.

9. A thermosetting resin composition comprising:

- A) a benzoxazine compound,
- B) a liquid maleimide,
- C) a coupling agent, and
- D) a cure initiator,

wherein said benzoxazine compound has the structure:

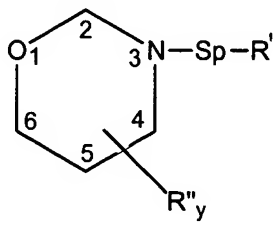


wherein:

L is an optional alkylene or siloxane linking moiety,

Ar is optionally substituted arylene,

Q is an oxazine ring or amine salt thereof having the structure:



and is bonded to Ar in a fused manner at positions 5 and 6 of the oxazine ring,

wherein:

Sp is optional, and if present, is a C<sub>1</sub> to C<sub>6</sub> alkylene, oxyalkylene, thioalkylene, carboxyalkylene, amidoalkylene, or sulfonatoalkylene spacer,

n is 1 or 2,

m is 1 or 2,

x and y are each independently 0 to 4, and

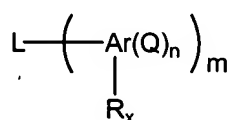
wherein at least one of R, R', or R'' is a polymerizable moiety.

10. A die-attach paste comprising:

in the range of about 10 up to 80 wt% of a thermosetting resin composition according to claim 9, and

in the range of about 20 up to about 90 wt% of a filler.

11. A die-attach paste according to claim 10, wherein the filler is conductive.
12. A die-attach paste according to claim 11, wherein said filler is electrically conductive.
13. A die-attach paste according to claim 11, wherein said filler is thermally conductive.
14. A method for enhancing adhesive strength of a thermosetting resin composition, said method comprising incorporating into said composition an effective amount of a compound having the structure:

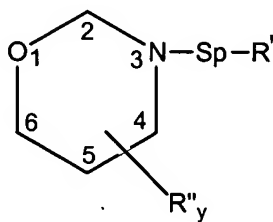


wherein:

L is an optional alkylene or siloxane linking moiety,

Ar is optionally substituted arylene,

Q is an oxazine ring or amine salt thereof having the structure:



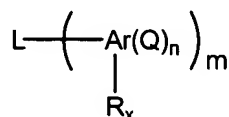
and is bonded to Ar in a fused manner at positions 5 and 6 of the oxazine ring,

wherein:

Sp is optional, and if present, is a C<sub>1</sub> to C<sub>6</sub> alkylene, oxyalkylene, thioalkylene, carboxyalkylene, amidoalkylene, or sulfonatoalkylene spacer,

n is 1 or 2,  
 m is 1 or 2,  
 x and y are each independently 0 to 4, and  
 wherein at least one of R, R', or R'' is a polymerizable moiety.

15. A method for enhancing adhesion of a substrate bound to a metallic surface by a thermosetting resin composition, said method comprising incorporating into said thermosetting resin composition a compound having the structure:

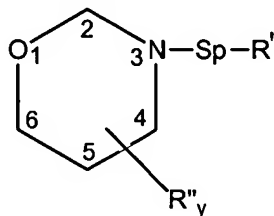


wherein:

L is an optional alkylene or siloxane linking moiety,

Ar is optionally substituted arylene,

Q is an oxazine ring or amine salt thereof having the structure:



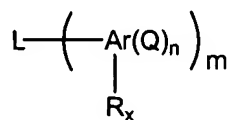
and is bonded to Ar in a fused manner at positions 5 and 6 of the oxazine ring,  
 wherein:

Sp is optional, and if present, is a C<sub>1</sub> to C<sub>6</sub> alkylene, oxyalkylene, thioalkylene, carboxyalkylene, amidoalkylene, or sulfonatoalkylene spacer,

n is 1 or 2,  
 m is 1 or 2,  
 x and y are each independently 0 to 4, and  
 wherein at least one of R, R', or R'' is a polymerizable moiety.

16. A method according to claim 15, wherein said metallic surface is copper.

17. A method for adhesively attaching a substrate to a metallic surface, said method comprising curing a die-attach paste positioned between said substrate and said metallic surface, wherein said die-attach paste comprises a compound having the structure:

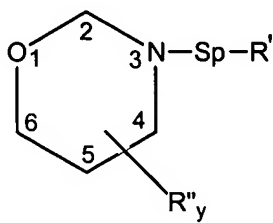


wherein:

L is an optional alkylene or siloxane linking moiety,

Ar is optionally substituted arylene,

Q is an oxazine ring or amine salt thereof having the structure:



and is bonded to Ar in a fused manner at positions 5 and 6 of the oxazine ring,

wherein:

Sp is optional, and if present, is a C<sub>1</sub> to C<sub>6</sub> alkylene, oxyalkylene, thioalkylene, carboxyalkylene, amidoalkylene, or sulfonatoalkylene spacer,

n is 1 or 2,

m is 1 or 2,

x and y are each independently 0 to 4, and

wherein at least one of R, R', or R'' is a polymerizable moiety.

18. A method according to claim 17, wherein said substrate is a semiconductor die and said metallic surface is a lead frame.

19. A method according to claim 18, wherein said lead frame is a copper lead frame.